Appendix C

Transmission Line Detailed Stream Crossing Fish Habitat Assessments Booklets

Nelson River

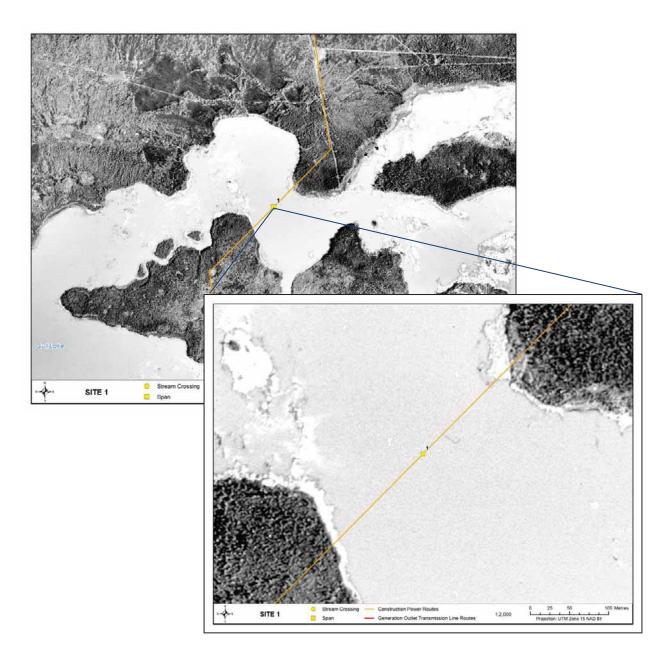
Location

Datum:	NAD 83	
UTM:	Zone: Easting: Northing:	15V 361949 6246916

Location Depicted Below:

🕥 General Morphology

Gen. Description:	Large river
Pattern:	Sinuous
Confinement:	Confined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	1,376,546 km ²
Receiving Water/Dist.:	Stephens Lake/6 km





Physical Data		Surve	y Date:	21 Ju	ly 2009	9	
Channel Profile							
Channel and Flow			Water 1	Depths ((m)		
Channel Width (m)	325			Max.	-		
Wetted Width (m)	325			Avg.	<5		
Sanks	5		Shape:	~45°		Ctal: 11:ton	at also
Right Bank Height (m): Left Bank Height (m):	~5 ~5		Shape: Shape:			Stability: Stability :	stable stable
Left Bank Height (III).	~5		Shape.	~45		Stability.	stable
ubstrate			Habita	at Typ	e		
ubstrate Type (%)					osition (%)	
Fines	-			Pool	-		
Small Gravel	-			Flat	-		
Large Gravel	-			Run	40		
Cobble	-			Riffle	60		
Boulder	-						
Cover Types						<u>Riparian</u>	
<u>lover Types</u>			US	DS		Kiparian	
Sotal Cover Available (%)			-	-		Riparian Vegetation	Гуре (Y/N)
Cover Composition (%	of Total)					Moss	
Large Woody D			_	_		Grasses/Sedges	-
Overhanging V			_	_		Shrubs	-
Instream Vegeta			-	-		Conifers	Y
Pool			-	-		Deciduous	-
Boulder			-	-		Mixed Forest	-
Undercut Bank			-	-			
Surface Turbule	ence		-	-		Canopy Cover (%)	-
- Water Quality Dat	.а						
Surface Temp (°C):			-			DO (mg/L):	-
Specific Conductance (uS/cm):		-			рН:	-

+ Fish Habitat PotentialSpawningRearing/FeedingOverwinteringLarge-Bodied Fish:HighModerateLowSmall-Bodied Fish:LowLowLowImpediments to Migration:Rapids immediately downstreamKearing/Feeding

Common Fish: brook stickleback, burbot, cisco, fathead minnow, finescale dace, freshwater drum, goldeye, Iowa darter, Johnny darter, lake chub, lake sturgeon, lake whitefish, longnose dace, longnose sucker, mooneye, northern pike, northern redbelly dace, pearl dace, rainbow smelt, sauger, slimy sculpin, spottail shiner, trout-perch, walleye, white sucker, yellow perch (J. Holm, pers. comm., July 2011)

+ Fish and Fish Habitat Sensitivity

Sensitivity Rating:	Moderate-High
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Photo 1. View of crossing at Site 1.

Photo 2. Upstream view of Site 1.



Photo 3. Downstream view of Site 1.

*Dashed red line indicates proposed crossing location



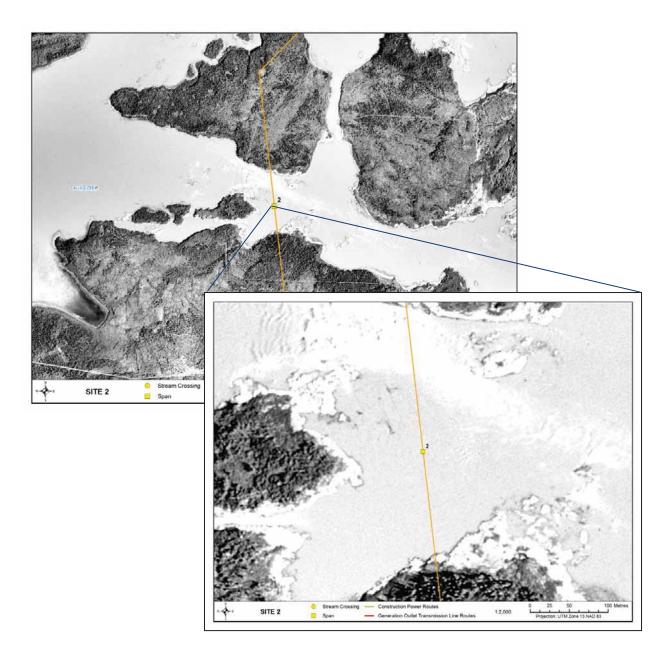
Nelson River

N	Location
No. of Concession, Name	

Datum:	NAD 83	
UTM:	Zone: Easting: Northing:	15V 361680 6245817
Location Depic	ted Below:	

Seneral Morphology

Gen. Description:	Large river
Pattern:	Sinuous
Confinement:	Confined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	1,376,546 km ²
Receiving Water/Dist.:	Stephens Lake/7 km





Physical Data	Su	rvey Date:	21 Ju	ly 2009	9	
Channel Profile						
Channel and Flow		Water	Depths ((m)		
Channel Width (m)	300		Max.	-		
Wetted Width (m)	300		Avg.	<5		
Banks						
Right Bank Height (m):	~5	Shape:			Stability:	stable
Left Bank Height (m):	~5	Shape:	~45°		Stability :	stable
Substrate		Habit	at Typ	e		
Substrate Type (%)			t Compo		%)	
Fines	-	1100100	Pool	-	,	
Small Gravel	-		Flat	-		
Large Gravel	-		Run	20		
Cobble	-		Riffle	80		
Boulder	-					
Cover Tunes					Dinavian	
<u>Cover Types</u>		US	DS		<u>Riparian</u>	
Fotal Cover Available (%)		-	-		Riparian Vegetation	Гуре (Y/N)
						••• • •
Cover Composition (%					Moss	-
Large Woody D		-	-		Grasses/Sedges	-
Overhanging Vo		-	-		Shrubs Conifers	- Y
Instream Vegeta Pool	ation	-	-		Deciduous	I
Boulder		-	-		Mixed Forest	-
Undercut Bank			-		WINCU POICSt	-
Surface Turbule	ence	-	-		Canopy Cover (%)	-
+ Water Quality Dat	ta					
Surface Temp (°C):		-			DO (mg/L):	-
Specific Conductance (μS/cm):	-			pH:	-
TDS (g/L):		-			Turbidity (NTU):	-
Salinity (ppt):						

+ Fish Habitat Potential	Spawning	Rearing/Feeding	Overwintering
Large-Bodied Fish:	Low	Low	Low
Small-Bodied Fish:	Low	Low	Low
Impediments to Migration: Rapids immedia	ately downstream		

Common Fight, brook stickle hash humbed attely downstream

Common Fish: brook stickleback, burbot, cisco, fathead minnow, finescale dace, freshwater drum, goldeye, Iowa darter, Johnny darter, lake chub, lake sturgeon, lake whitefish, longnose dace, longnose sucker, mooneye, northern pike, northern redbelly dace, pearl dace, rainbow smelt, sauger, slimy sculpin, spottail shiner, trout-perch, walleye, white sucker, yellow perch (J. Holm, pers. comm., July 2011)

+ Fish and Fish Habitat Sensitivity

Sensitivity Rating: Moderate-High (due to proximity of moderate-high valued fish habitats downstream)

Manitoba Hydro: Keeyask Transmission Project Watercourse Crossing Assessment: Site 2 - Nelson River Page 2 of 3





Photo 1. View of crossing at Site 2.

Photo 2. Upstream view of Site 2.

*Dashed red line indicates proposed crossing location



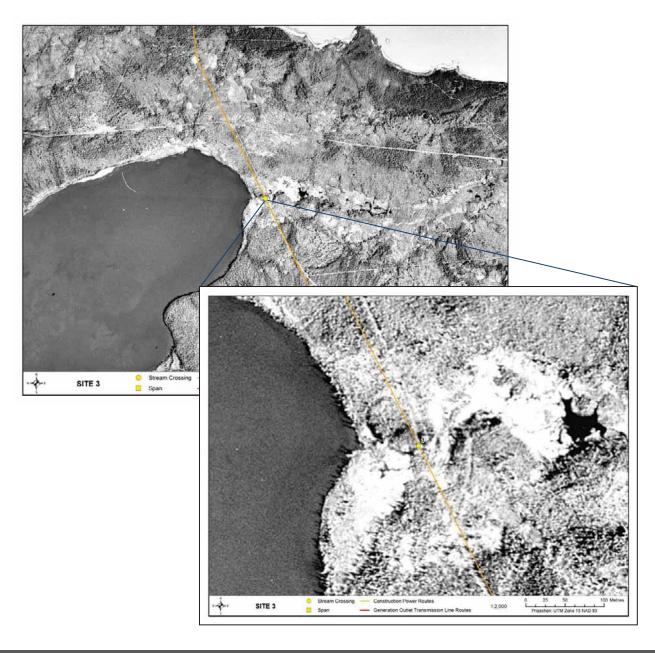
Gull Rapids Creek

Location

Datum:	NAD 83	
UTM:	Zone: Easting: Northing:	15V 362118 6244522
Location Depic	ted Below:	

General Morphology

Gen. Description:	Wetland/bog drainage
Pattern:	Sinuous
Confinement:	Unconfined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	6.5 km^2
Receiving Water/Dist.:	Nelson River/2.5 km





Ph	ysical Data	Sur	vey Date:	21 Ju	ly 2009)	
Chanr	el Profile						
Channe	el and Flow		Water	Depths	(m)		
	Channel Width (m)	7.3-15.5		Max.	1.0		
D 1	Wetted Width (m)	7.3-15.5		Avg.	0.5		
Banks	Dight Don't Unight (m)		Change			Stability	
	Right Bank Height (m): Left Bank Height (m):	-	Shape: Shape:			Stability: Stability :	-
	Lett Dank Height (III):	-	Shape:	-		Stability :	-
Substr	ate		Habita	at Typ	e		
	te Type (%)				esition (S	%)	
Substit	Fines	100	iiuoitu	Pool	-		
	Small Gravel	-		Flat	50		
	Large Gravel	-		Run	50		
	Cobble	_		Riffle			
	Boulder	-		Rune			
<u>Cover</u>	Types		LIC.	DC		<u>Riparian</u>	
Total Cover Available (%)		US 70	DS 70		Riparian Vegetation	Type (V/N)	
Total	over Available (70)		70	70		Riparian vegetation	1 ype (1/10)
	Cover Composition (%	of Total)				Moss	-
	Large Woody D		1	5		Grasses/Sedges	-
	Overhanging Ve		-	95		Shrubs	-
	Instream Vegeta		99	-		Conifers	-
	Pool		-	-		Deciduous	-
	Boulder		-	-		Mixed Forest	-
	Undercut Bank		-	-			
	Surface Turbule	nce	-	-		Canopy Cover (%)	-
+ Wa	ater Quality Dat	а					
	Surface Temp (°C):		17.2			DO (mg/L):	4.14
	Specific Conductores (S(am).					
	Specific Conductance (µ	ıS/cm):	62			pH: Turbidity (NTU):	5.56
	TDS (g/L):	ιS/cm):	62 0.04			рн: Turbidity (NTU):	5.56 947
		ıS/cm):					

+ Fish Habitat Potential

Large-Bodied Fish: Small-Bodied Fish:

N

Spawning Moderate Moderate Rearing/Feeding Moderate Moderate

Overwintering

Low Moderate

Impediments to Migration: None observed Fish Presence: Unknown

+ Fish and Fish Habitat Sensitivity





Photo 1. Downstream view of crossing at Site 3.



Photo 2. Upstream view of Site 3.



Photo 3. Site 3 fed by a lake upstream of crossing.



Photo 4. Aerial view of Site 3 looking downstream.



Unnamed Watercourse

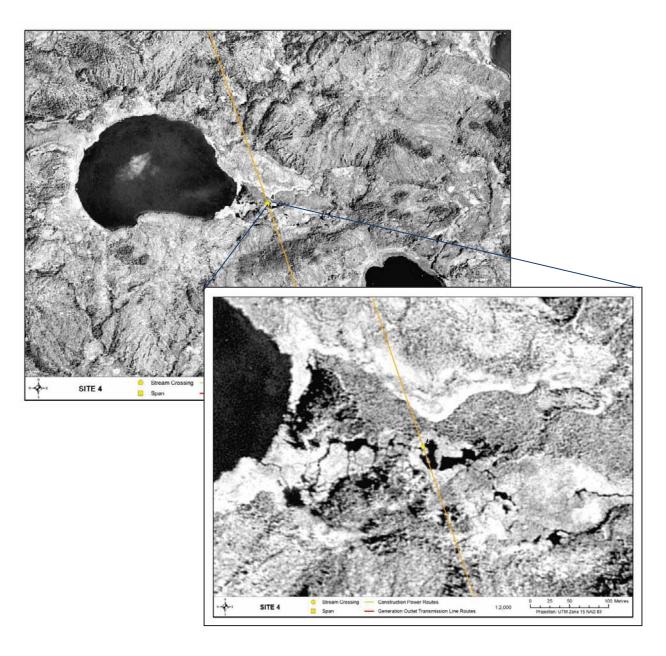
Location

Location Depicted Below:

Datum:	NAD 83	
UTM:	Zone: Easting: Northing:	15V 363081 6242215

General Morphology

Gen. Description:	Wetland/bog drainage
Pattern:	-
Confinement:	Unconfined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	1.85 km^2
Receiving Water/Dist.:	Butnau River/38 km





Physical Data		Survey Da	te: 21 Ju	ly 2009		
Channel Profile						
Channel and Flow		Wat	er Depths	(m)		
Channel Width (m)	135		Max.	-		
Wetted Width (m)	135		Avg.	-		
Banks	`	C1			0.1.11	. 11
Right Bank Height (m		1	e: -		Stability:	stable
Left Bank Height (m)	: -	Shap	e: -		Stability :	stable
Substrate		Hal	oitat Typ	e		
Substrate Type (%)			itat Comp		()	
Fines	100	IIub	Pool	100	•)	
Small Gravel	-		Flat	-		
Large Gravel	_		Run	_		
Cobble	_		Riffle	_		
Boulder	_		Killie			
<u>Cover Types</u>		US	DS		<u>Riparian</u> Riparian Vegetation	Type (Y/N)
Fotal Cover Available (%)		-				
	(9/ afTatal)	-				
Cover Composition (-			Moss	-
Cover Composition (Large Wood	y Debris	-	-		Moss Grasses/Sedges	- Y
Cover Composition (Large Wood Overhanging	y Debris y Vegetation	-	- -		Moss Grasses/Sedges Shrubs	-
Cover Composition Large Wood Overhanging Instream Veg	y Debris y Vegetation	- - -	- -		Moss Grasses/Sedges Shrubs Conifers	- Y
Cover Composition (Large Wood Overhanging Instream Veg Pool	y Debris y Vegetation	- - -	- - -		Moss Grasses/Sedges Shrubs Conifers Deciduous	- Y Y -
Cover Composition (Large Wood Overhanging Instream Veg Pool Boulder	y Debris y Vegetation getation	- - - -	- - -		Moss Grasses/Sedges Shrubs Conifers	- Y
Cover Composition (Large Wood Overhanging Instream Veg Pool Boulder Undercut Ba	y Debris y Vegetation getation nk	- - - - -			Moss Grasses/Sedges Shrubs Conifers Deciduous Mixed Forest	- Y Y -
Cover Composition (Large Wood Overhanging Instream Veg Pool Boulder	y Debris y Vegetation getation nk	- - - - -	- - - - -		Moss Grasses/Sedges Shrubs Conifers Deciduous	- Y Y -
Cover Composition (Large Wood Overhanging Instream Veg Pool Boulder Undercut Ba	y Debris y Vegetation getation nk pulence	- - - - -			Moss Grasses/Sedges Shrubs Conifers Deciduous Mixed Forest	- Y Y -
Cover Composition (Large Wood Overhanging Instream Veg Pool Boulder Undercut Ba Surface Turb	y Debris y Vegetation getation nk pulence	- - - - - - 14.8	- - - -		Moss Grasses/Sedges Shrubs Conifers Deciduous Mixed Forest Canopy Cover (%)	- Y Y -
Cover Composition (Large Wood Overhanging Instream Veg Pool Boulder Undercut Ba Surface Turb + Water Quality D Surface Temp (°C):	y Debris y Vegetation getation nk pulence	- - - - - - 14.8 79	- - - -		Moss Grasses/Sedges Shrubs Conifers Deciduous Mixed Forest Canopy Cover (%)	- Y Y - Y
Cover Composition (Large Wood Overhanging Instream Veg Pool Boulder Undercut Ba Surface Turb	y Debris y Vegetation getation nk pulence				Moss Grasses/Sedges Shrubs Conifers Deciduous Mixed Forest Canopy Cover (%)	- Y - Y - 5.19

+ Fish Habitat PotentialSpawningRearing/FeedingOverwinteringLarge-Bodied Fish:ModerateModerateLowSmall-Bodied Fish:ModerateModerateLow

Impediments to Migration: Low water during summer and fall might restrict fish movement in the ROW area **Fish Presence:** Unknown

+ Fish and Fish Habitat Sensitivity









Photo 2. Aerial view of Site 4.



Unnamed Watercourse

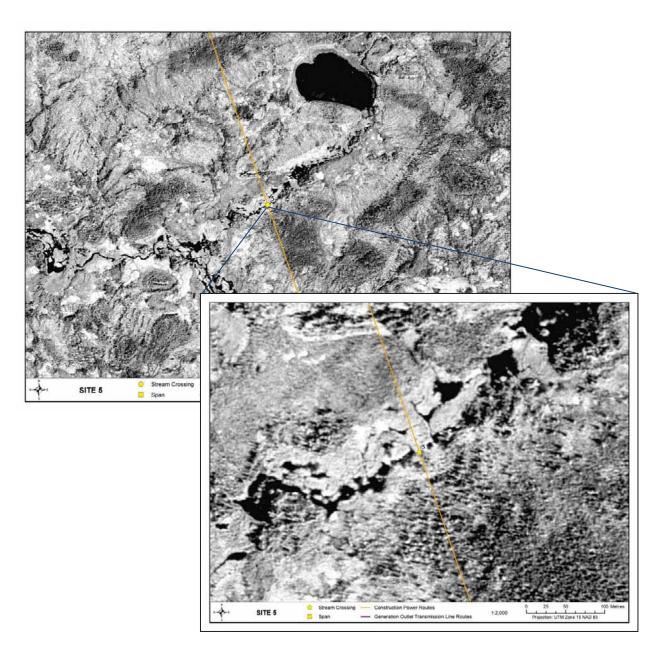
Location

Location Depicted Below:

Datum:	NAD 83	
UTM:	Zone: Easting: Northing:	15V 363467 6241084

General Morphology

Gen. Description:	Wetland/bog drainage
Pattern:	-
Confinement:	Unconfined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	5 km^2
Receiving Water/Dist.:	Stephens Lake/36 km





Site Conditions

+ Ph	ysical Data	9	Survey Date	e: 22 Ju	ıly 2009		
Chann	nel Profile el and Flow Channel Width (m) Wetted Width (m)	-	Water	r Depths Max. Avg.	(m) ~1.5 -		
Banks	Right Bank Height (m): Left Bank Height (m):	-	Shape Shape			Stability: Stability :	stable stable
Substra	rate ate Type (%) Fines Small Gravel Large Gravel Cobble Boulder	100 - - -		tat Typ at Comp Pool Flat Run Riffle	<u>e</u> osition (% 100 - - -	%)	
	<u>• Types</u> Cover Available (%)		US 50	DS 50		<u>Riparian</u> Riparian Vegetation	Type (Y/N)
	Cover Composition (% Large Woody D Overhanging Ve Instream Vegeta Pool Boulder Undercut Bank Surface Turbule	ebris egetation ation	1 - 99 - - - -	1 - 99 - - -		Moss Grasses/Sedges Shrubs Conifers Deciduous Mixed Forest Canopy Cover (%)	- Y Y - -
+ Wa	ater Quality Dat	a					
	Surface Temp (°C): Specific Conductance (µ TDS (g/L): Salinity (ppt):	ıS/cm):	- - -			DO (mg/L): pH: Turbidity (NTU):	-

Sish Habitat Classification and Sensitivity

+ Fish Habitat Potential

Large-Bodied Fish: Small-Bodied Fish: Spawning Moderate

Moderate

Rearing/Feeding Moderate Moderate Overwintering

Low Low

Impediments to Migration: None observed Fish Presence: Unknown

+ Fish and Fish Habitat Sensitivity





Photo 1. Looking upstream towards Site 5.



Photo 2. Aerial view of Site 5.



Photo 3. Downstream view of Site 5.



Photo 4. Lake upstream from Site 5.



Unnamed Tributary of Joslin Lake

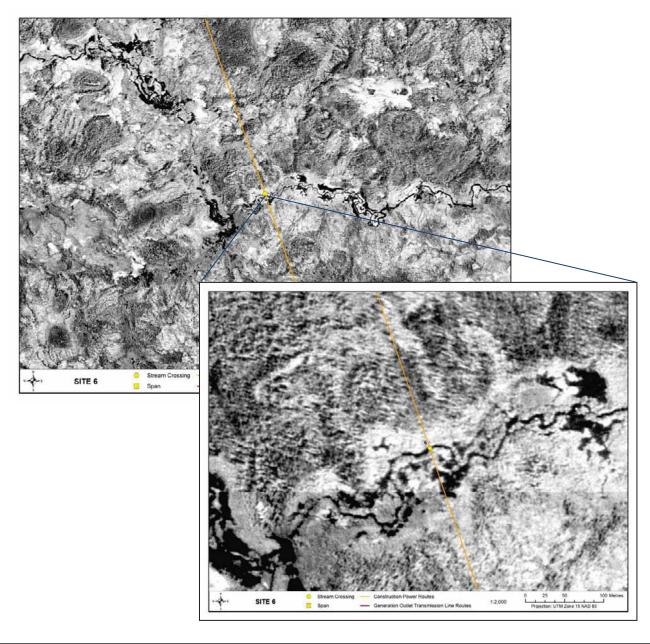
Location

Location Depicted Below:

Datum:	NAD 83	
UTM:	Zone: Easting: Northing:	15V 363818 6240056

General Morphology

Gen. Description:	Wetland/bog drainage
Pattern:	-
Confinement:	Unconfined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	51 km ²
Receiving Water/Dist.:	Butnau River/33 km





Site Conditions

+ Ph	ysical Data	S	Survey Date:	22 July	2009		
Channe	nel Profile el and Flow Channel Width (m) Wetted Width (m)	-	Water	Depths (n Max. Avg.	n) ~1.5 -		
Banks	Right Bank Height (m): Left Bank Height (m):	-	Shape: Shape:			Stability: Stability :	stable stable
<u>Substr</u> Substra	ate Type (%) Fines Small Gravel Large Gravel Cobble	100 - -		at Type t Compos Pool Flat Run Riffle	ition (% 100 - -))	
	Boulder • Types Cover Available (%)	-	US 60	DS 60		<u>Riparian</u> Riparian Vegetation 7	Гуре (Y/N)
	Cover Composition (% Large Woody D Overhanging Ve Instream Vegeta Pool Boulder Undercut Bank Surface Turbule	ebris egetation ation	1 - 99 - - - -	1 - 99 - - -		Moss Grasses/Sedges Shrubs Conifers Deciduous Mixed Forest Canopy Cover (%)	- Y Y Y - -
+ Wa	ater Quality Dat Surface Temp (°C): Specific Conductance (p TDS (g/L): Salinity (ppt):		- - -			DO (mg/L): pH: Turbidity (NTU):	- -

Sish Habitat Classification and Sensitivity

+ Fish Habitat Potential

Large-Bodied Fish: Small-Bodied Fish: Spawning Moderate

Moderate

Rearing/Feeding Moderate Moderate Overwintering

Low Low

Impediments to Migration: None observed Fish Presence: Unknown

+ Fish and Fish Habitat Sensitivity





Photo 1. Looking downstream towards Site 6.



Photo 2. Aerial view of Site 6.



Photo 3. Joslin Lake is located approximately 2.3 km downstream of Site 6.



Unnamed Watercourse

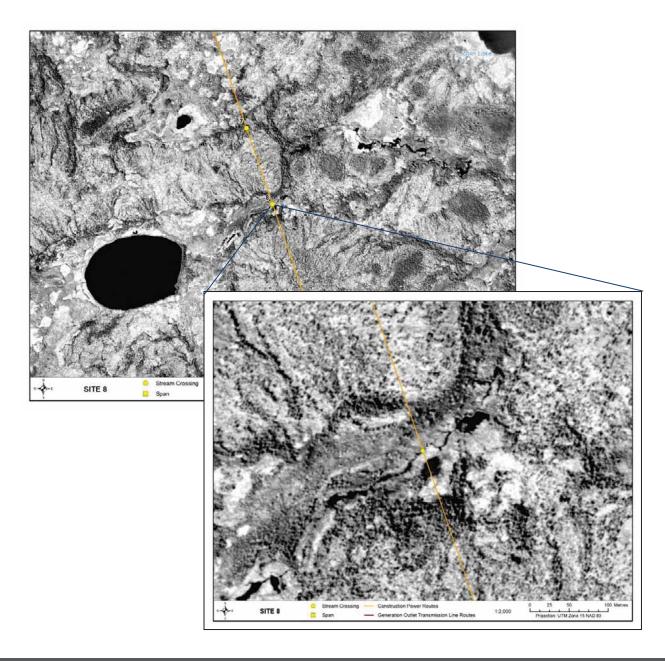
Location	Y	Location
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Location Depicted Below:

Datum:	NAD 83	
UTM:	Zone: Easting: Northing:	15V 364530 6237968

General Morphology

Gen. Description:	Wetland/bog drainage
Pattern:	Irregular
Confinement:	Unconfined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	1.77 km^2
Receiving Water/Dist.:	Stephens Lake/32 km





Site Conditions

+ Ph	ysical Data		Surve	y Date:	22 Ju	ly 2009		
	nel Profile							
Channe	el and Flow			Water	Depths	(m)		
	Channel Width (m)	-			Max.	~1.0		
	Wetted Width (m)	-			Avg.	-		
Banks	· · ·				C			
	Right Bank Height (m):	_		Shape:	-		Stability:	stable
	Left Bank Height (m):	_		Shape:			Stability :	stable
	Lett Duik Height (III).			Shape.			Stability.	studie
Subst	rate			Habit	at Typ	e		
	ate Type (%)					osition (%	()	
	Fines	100			Pool	100	.,	
	Small Gravel	-			Flat	-		
	Large Gravel				Run			
	Cobble	_			Riffle	-		
	Boulder	-			Kinie	-		
	Boulder	-						
Cover	· Types						<u>Riparian</u>	
Cover	<u>I ypcs</u>			US	DS		<u>Kiparian</u>	
T.4.10	····· · · · · · · · · · · · · · · · ·						D'a star Mandala	
I otal C	Cover Available (%)			60	60		Riparian Vegetation	Type (Y/N)
	Cover Composition (%	of Total)					Moss	-
	Large Woody D	ebris		-	-		Grasses/Sedges	Y
	Overhanging Ve	egetation		10	10		Shrubs	Y
	Instream Vegeta			90	90		Conifers	Y
	Pool			_	_		Deciduous	-
	Boulder			-	_		Mixed Forest	-
	Undercut Bank			_	_			
	Surface Turbule	nce		_			Canopy Cover (%)	
	Surface Turbule	nee					Canopy Cover (70)	
+ Wa	ater Quality Dat	a						
	Surface Temp (°C):			-			DO (mg/L):	-
	Specific Conductance (uS/cm):		-			pH:	-
	TDS (g/L):			-			Turbidity (NTU):	_
	Salinity (ppt):			_				

Fish Habitat Classification and Sensitivity

+ Fish Habitat Potential

Large-Bodied Fish: Small-Bodied Fish: Spawning

Moderate Moderate

Low-Moderate Moderate

Rearing/Feeding

Overwintering

Low Low

Impediments to Migration: None observed Fish Presence: Unknown

+ Fish and Fish Habitat Sensitivity





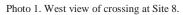




Photo 2. East view of crossing Site 8.



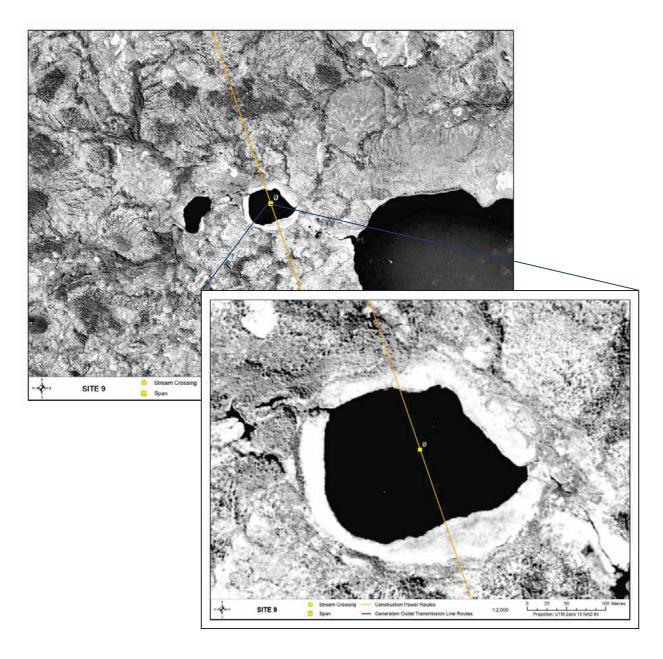
Unnamed Lake

Location

Datum:	NAD 83	
UTM:	Zone: Easting: Northing:	15v 365102 6236293
Location Depic	ted Below:	

General Morphology

Gen. Description:	Small shallow lake
Pattern:	-
Confinement:	-
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	0.7 km^2
Receiving Water/Dist.:	Butnau River/34 km





Site Conditions

+ Ph	ysical Data	S	Survey Date	: 22 Ju	lv 2009		
			un roy Dato	. 22 00	19 200 /		
	nel Profile el and Flow Channel Width (m) Wetted Width (m)	-	Water	Depths Max. Avg.	(m) <5 m -		
	Right Bank Height (m): Left Bank Height (m):	-	Shape: Shape:			Stability: Stability :	stable stable
<u>Subst</u> Substr	<u>rate</u> ate Type (%)			at Typ t Comp	<u>e</u> osition (%	(0)	
	Fines Small Gravel Large Gravel Cobble Boulder	100 - - -		Pool Flat Run Riffle	100 - - -	~)	
	<u>r Types</u> Cover Available (%)		US -	DS -		<u>Riparian</u> Riparian Vegetation ⁷	Гуре (Y/N)
	Cover Composition (% Large Woody D Overhanging Ve Instream Vegeta Pool Boulder Undercut Bank Surface Turbule	bebris egetation ation		- - - -		None Grasses/Sedges Shrubs Conifers Deciduous Mixed Forest Canopy Cover (%)	- Y Y Y - - - 0
+ Wa	ater Quality Dat	a					
	Surface Temp (°C): Specific Conductance (µ TDS (g/L): Salinity (ppt):		- - -			DO (mg/L): pH: Turbidity (NTU):	-

Sish Habitat Classification and Sensitivity

+ Fish Habitat Potential

Large-Bodied Fish: Small-Bodied Fish: Spawning

Low Moderate Rearing/Feeding Moderate Moderate

Overwintering

Low-Moderate Moderate

Impediments to Migration: None observed Fish Presence: Unknown

+ Fish and Fish Habitat Sensitivity





Photo 1. Downstream view towards the Site 9 lake (looking southeast).



Photo 2. Downstream view towards the Site 9 lake (looking east).



Photo 3. Lake upstream of the Site 9 lake (looking northwest).



Photo 4. Downstream view towards the Site 9 lake (looking southeast).



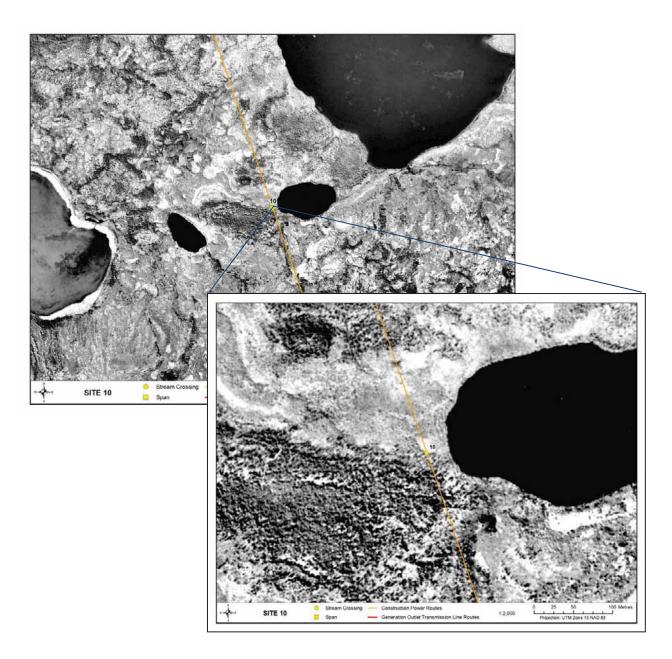
Unnamed Creek

Location

Datum:	NAD 83	
UTM:	Zone: Easting: Northing:	15V 365611 6234902
Location Depic	ted Below:	

🕥 General Morphology

Gen. Description:	Wetland/bog drainage
Pattern:	-
Confinement:	Unconfined
Stage:	Flooded
Flow Regime:	Perennial
U/S Drainage:	0.07 km^2
Receiving Water/Dist.:	Butnau River/33.5 km





+ Physical Data		Survey	Date:	22 Ju	ly 2009)	
Channel Profile							
Channel and Flow			Water 1	Depths (m)		
Channel Width (m)	5-10			Max.	~1.0		
Wetted Width (m)	10-20			Avg.	-		
Banks							
Right Bank Height (m):	-		Shape:			Stability:	stable
Left Bank Height (m):	-		Shape:	-		Stability :	stable
Substrate			Hahita	at Type			
Substrate Type (%)			Habitat	Compo	<u>-</u> sition (%	()	
Fines	100		1140114	Pool	90	(0)	
Small Gravel	-			Flat	10		
Large Gravel	-			Run	-		
Cobble	-			Riffle	-		
Boulder	-						
Cover Types						Dinarian	
<u>cover rypes</u>			US	DS		<u>Riparian</u>	
Fotal Cover Available (%)			30	30		Riparian Vegetation	Type (V/N)
i otar Cover Available (70)			50	50		Repartan vegetation	(1/1()
Cover Composition (%	of Total)					Moss	-
Large Woody D			2	2		Grasses/Sedges	Y
Overhanging V			28	28		Shrubs	Y
Instream Vegeta	ation		70	70		Conifers	Y
Pool			-	-		Deciduous	-
Boulder			-	-		Mixed Forest	-
Undercut Bank			-	-			
Surface Turbule	ence		-	-		Canopy Cover (%)	-
+ Water Quality Dat	а						
3			147				C 05
Surface Temp (°C): Specific Conductores (S(om).		14.7 82			DO (mg/L): pH:	6.05 6.18
Specific Conductance (us/em):		82 0.05			рн: Turbidity (NTU):	6.18 3.78
TDS (g/L):							

+ Fish Habitat Potential

Large-Bodied Fish: Small-Bodied Fish:

N

Spawning Moderate Moderate Rearing/Feeding Low-Moderate Moderate Overwintering

Low Low

Impediments to Migration: None observed Fish Presence: Unknown

+ Fish and Fish Habitat Sensitivity





Photo 1. View of Site 6 crossing.



Photo 2. Upstream view from crossing at Site 10.



Photo 3. Site 10's downstream connection to unnamed lake.



Photo 4. Downstream view 50 m from Site 10.



Butnau River

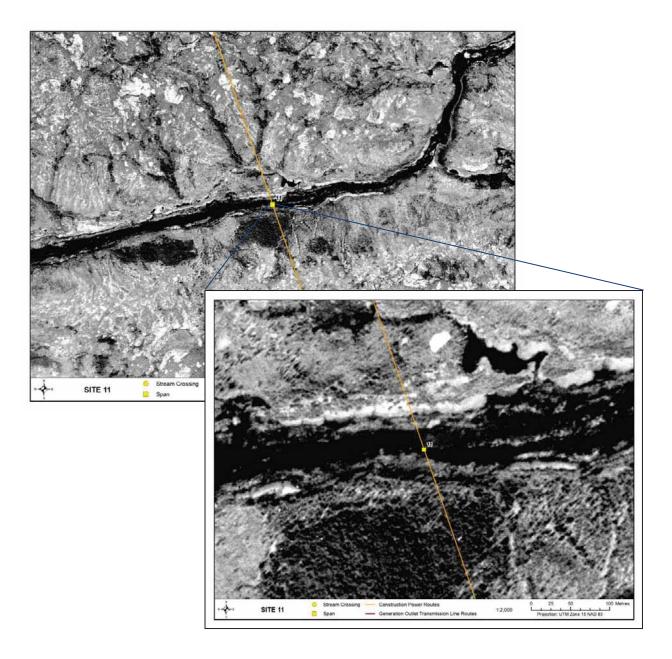
Location

Location Depicted Below:

Datum:	NAD 83	
UTM:	Zone: Easting: Northing:	15V 366641 6231782

General Morphology

Gen. Description:Small riverPattern:SinuousConfinement:UnconfinedStage:ModerateFlow Regime:PerennialU/S Drainage:579 km²Receiving Water/Dist.:Kettle River/42 km





Phys	ical Data		Surve	y Date:	22 Ju	ly 2009)	
Channel	Profile							
Channel aı				Water 1	Depths	(m)		
	annel Width (m)	80			Max.	-		
	etted Width (m)	80			Avg.	-		
Banks	1 (D 1 II ' 1 ()	4		01	450		0, 1, 11,	. 11
	ght Bank Height (m):	~4		Shape: Shape:			Stability:	stable stable
Le	ft Bank Height (m):	~3		Snape:	~45*		Stability :	stable
Substrate	4			Habita	at Typ	e		
Substrate 7	Type (%)					<u>e</u> sition (%	()	
Fi		100		1100100	Pool	50	•)	
Sn	nall Gravel	-			Flat	50		
La	rge Gravel	-			Run	-		
	bble	-			Riffle	-		
Bo	oulder	-						
	1705						Dinarian	
Cover Ty	pes			US	DS		<u>Riparian</u>	
Fotal Cove	r Available (%)			30	30		Riparian Vegetation	$Evne\left(\mathbf{V}/\mathbf{N}\right)$
	I Available (70)			50	50		Riparian vegetation	I ypc (1/1()
Co	over Composition (%	of Total)					Moss	-
	Large Woody D			-	-		Grasses/Sedges	Y
	Overhanging Ve	getation		30	30		Shrubs	Y
	Instream Vegeta			70	70		Conifers	Y
	Pool			-	-		Deciduous	-
	Boulder			-	-		Mixed Forest	-
				-	-			
	Undercut Bank						Canopy Cover (%)	-
	Undercut Bank Surface Turbule	nce		-	-			
		nce		-	-			
+ Wate				-	-			
Su	Surface Turbule or Quality Dat rface Temp (°C):	а		-	-		DO (mg/L):	-
Su Sp	Surface Turbule TOUALITY Dat Inface Temp (°C): Accific Conductance (J	а		-	-		pH:	-
Su Sp TI	Surface Turbule or Quality Dat rface Temp (°C):	а		-	-			- - -

+ Fish Habitat Potential

Large-Bodied Fish: Small-Bodied Fish: Moderate Moderate

Spawning

Rearing/Feeding Moderate Moderate

Overwintering

Moderate Moderate

Impediments to Migration: None observed

Fish Presence: lake whitefish, longnose sucker, northern pike, walleye, and white sucker (Johnson and Barth 2007)

+ Fish and Fish Habitat Sensitivity

Sensitivity Rating:

Moderate

Manitoba Hydro: Keeyask Transmission Project Watercourse Crossing Assessment: Site 11 – Butnau River Page 2 of 3







Photo 1. View of Site 11 crossing.

Photo 2. Downstream view of crossing Site 11.



Photo 3. Flooded and instream vegetation on south shore at Site 11.



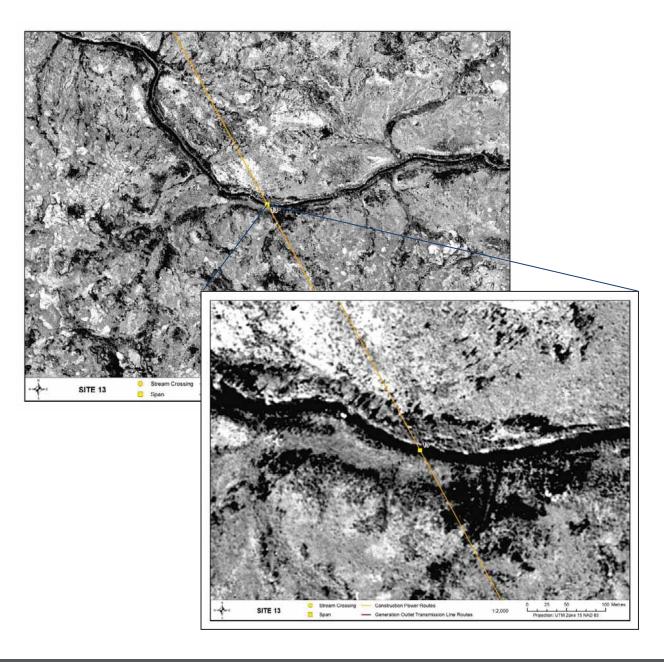
Butnau River

Location

Datum:	NAD 83	
UTM:	Zone: Easting: Northing:	15V 371885 6233701
Location Depic	ted Below:	

Seneral Morphology

Gen. Description:	Small river
Pattern:	Sinuous
Confinement:	Unconfined
Stage:	Moderate
Flow Regime:	Perennial
U/S Drainage:	619 km^2
Receiving Water/Dist.:	Kettle River/34 km





Physical Data		Surve	y Date:	22 July	/ 2009		
Channel Profile							
Channel and Flow			Water 1	Depths (n	n)		
Channel Width (m)	20			Max.	-		
Wetted Width (m)	20			Avg.	-		
Banks							
Right Bank Height (m):	<5			rounded		Stability:	Stable
Left Bank Height (m):	<3		Shape:	rounded		Stability :	Stable
Substrate			Habits	at Type			
Substrate Type (%)				t Compos	ition (%	()	
Fines	_		man	Pool	-	•)	
Small Gravel	_			Flat	_		
Large Gravel	-			Run	100		
Cobble	_			Riffle	_		
Boulder	-						
<u>Cover Types</u>			TTG.	20		<u>Riparian</u>	
			US	DS			
Total Cover Available (%)			10	10		Riparian Vegetation	Type (Y/N)
Cover Composition (%	of Total)					Moss	-
Large Woody D			-	-		Grasses/Sedges	-
Overhanging Ve			50	50		Shrubs	Y
Instream Vegeta			25	25		Conifers	-
Pool			-	-		Deciduous	-
Boulder			-	-		Mixed Forest	-
Undercut Bank			25	25			
Surface Turbule	nce		-	-		Canopy Cover (%)	0
+ Water Quality Dat	a						
Surface Temp (°C):			-			DO (mg/L):	-
Specific Conductance (uS/cm):		-			pH:	-
Specific Conductance (
TDS (g/L):			-			Turbidity (NTU):	-

+ Fish Habitat Potential	Spawning	Rearing/Feeding	Overwintering
Large-Bodied Fish:	Low	Moderate	Low
Small-Bodied Fish:	Low	Moderate	Moderate

Impediments to Migration: None observed

Fish Presence: lake whitefish, longnose sucker, northern pike, walleye, white sucker (Johnson and Barth 2007)

+ Fish and Fish Habitat Sensitivity

Sensitivity Rating: Moderate

N

Manitoba Hydro: Keeyask Transmission Project Watercourse Crossing Assessment: Site 13 – Butnau River Page 2 of 3





Photo 1. Upstream view of crossing at Site 13.



Photo 2. Downstream view of crossing at Site 13





Unnamed Tributary of Butnau River

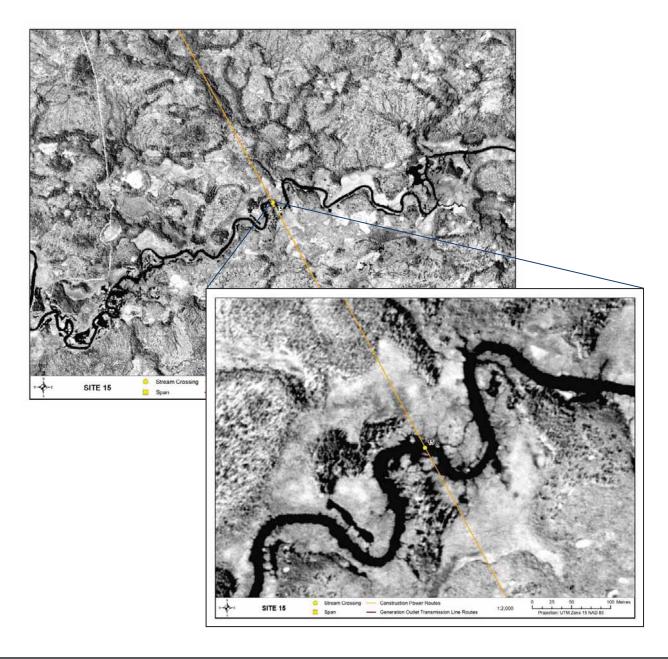
Location

Location Depicted Below:

Datum:	NAD 83	
UTM:	Zone: Easting: Northing:	15V 369262 6238537

General Morphology

Gen. Description:	low gradient boreal stream
Pattern:	Regular meander
Confinement:	Unconfined
Stage:	High/Flood
Flow Regime:	Perennial
U/S Drainage:	90 km^2
Receiving Water/Dist.:	Butnau River/16.5 km





Physical Data		Survey	/ Date:	22 Ju	ly 2009)		
Channel Profile								
Channel and Flow			Water 1	Depths	(m)			
Channel Width (m)	10			Max.	~1.5			
Wetted Width (m)	10			Avg.	~1.0			
Banks								
Right Bank Height (m):	-		Shape:			Stability:	Stable	
Left Bank Height (m):	-		Shape:	-		Stability :	Stable	
Substrate			Habita	at Typ	e			
Substrate Type (%)					osition (%	%)		
Fines	100			Pool	-			
Small Gravel	-			Flat	50			
Large Gravel	-			Run	50			
Cobble	-			Riffle	-			
Boulder	-							
Cover Types						<u>Riparian</u>		
			US	DS		Riparian		
Total Cover Available (%)			30	30		Riparian Vegetation Type (Y/N)		
Cover Composition (%	of Total)					Moss	_	
Large Woody D			30	30		Grasses/Sedges	Y	
Overhanging Vo			10	10		Shrubs	Y	
Instream Vegeta			60	60		Conifers	Y	
Pool			-	-		Deciduous	-	
Boulder			_	_		Mixed Forest	-	
Undercut Bank			_	_				
Surface Turbule	ence		-	-		Canopy Cover (%)	0	
+ Water Quality Dat	a							
Surface Temp (°C):			-			DO (mg/L):	-	
Specific Conductance (uS/cm):		-			pH:	-	
TDS (g/L):			-			Turbidity (NTU):	-	
Salinity (ppt):								

+ Fish Habitat Potential

Large-Bodied Fish: Small-Bodied Fish:

N

Spawning

Moderate Moderate Rearing/Feeding Moderate Moderate

Overwintering

Low Moderate

Impediments to Migration: None observed Fish Presence: Unknown

+ Fish and Fish Habitat Sensitivity





Photo 1. Upstream view of Site 15.

Photo 2. Upstream connection to Joslin Lake near Site 15.



Photo 3. Downstream view of Site 15.

